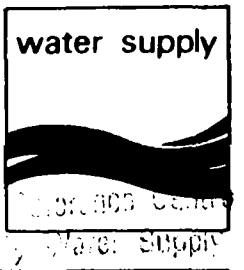
# INDIA
## SECTOR: WATER SUPPLY

Report of the Indo-Dutch Mission on the evaluation of the

Integrated Research and Demonstration Project on Slow Sand Filtration (Phases II and III)






July 1983

GOVERNMENT OF THE NETHERLANDS - MINISTRY OF FOREIGN AFFAIRS
Section for Research and Appropriate Technology

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## 1. SUMMARY

The Integrated Research and Demonstration Project on Slow Sand Filtration (SSF), initiated in 1976 and coordinated by the International Reference Centre for Community Water Supply and Sanitation (IRC), is being carried out in a number of countries simultaneously.

The present report is the evaluation of Phases II and III of the SSF project in as far as it is related to its Indian component, for which the National Environmental Engineering Research Institute (NEERI) is the coordinating agency.

The evaluation mission, consisting of Mr. R. Trietsch of DHV and Mr. R. Paramasivam of NEERI, attended the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support at NEERI in Nagpur (June 29 - July 1, 1983) and had extensive discussions with participants of this seminar as well as of the Chief Engineer's Conference which preceded the National Seminar, and with representatives of the various organizations involved in the SSF project itself.

On the basis of "topics for evaluation" as mentioned in the mission's Terms of Reference (see Appendix A) the effectivity, efficiency and significance of the project and the suitability of the selected project approach have been evaluated.
The conclusions and recommendations following from this evaluation are given in chapter 5.
The present project evaluation does not give rise to any recommendations regarding modifications of the criteria of the Research Programme of the Netherlands Development Cooperation.

Summarizing, the project was found to be effective, efficient and significant in promoting the use of slow sand filtration for rural water supply in developing countries.

The mission supports IRC's proposals regarding the comparison of the health impact of different CEP/HE approaches (Appendix F) and for the development of an appropriate training for SSF plant operators (Appendix G).

It is recommended that the dissemination of information on slow sand filtration be continued also after the conclusion of Phase III of the SSF project. Here NEERI, assisted by IRC and possibly also by the Water Supply Coordinator at the Royal Netherlands Embassy (at least for those States where Netherlands-aided water supply programmes are implemented) could play an important role.

# 2. INTRODUCTION

## 2.1. Description of the project

The Integrated Research and Demonstration Project on Slow Sand Filtration (SSF) was initiated in 1976 by the International Reference Centre (IRC) for Community Water Supply and Sanitation, The Hague, The Netherlands. It is funded in the framework of the Research Programme of the Netherlands Development Cooperation.

The project comprises three phases:

In the first phase, applied research was carried out by NEERI in India and research institutes in Ghana, Kenya, Sudan and Thailand. The objective was to gain experience with the SSF process and to develop appropriate criteria for the design, construction, operation and maintenance of SSF schemes under local conditions.

In Phase II, the primary aim of the project was to study at the village level the effectiveness of SSF as a simple and reliable purification technique to produce safe drinking water and to study the practical problems of implementation including community involvement (see Appendix B for a more detailed description of the objectives of this phase).

This was accomplished by the construction of a number of demonstration plants in selected villages in Colombia, India, Jamaica, Kenya, Sudan and Thailand. At this stage an integrated approach was chosen, including community participation and health education, in order to increase the commitment of the community to ensure continued operation of the water supply system and to maximise the impact on health.

In India the villages selected for the demonstration programme were: Abub Shahar (Haryana), Borujwada (Maharashtra), Kamayagoundanpatti (Tamil Nadu) and Pothunuru (Andhra Pradesh).

In September 1980 an international meeting of representatives of the institutions participating in this project was organized at NEERI in Nagpur to review the project activities and to develop guidelines for further implementation. The results of this meeting were published in IRC Bulletin 16: Slow Sand Filtration for Cummunity Water Supply in Developing Countries.

In Phase III, the emphasis has been on dissemination of the results obtained, on promoting the inclusion of SSF schemes in national plans, on assisting the participating countries in obtaining funds for the implementation of SSF projects and on strengthening the technical cooperation between developing countries (see Appendix B).

In order to accomplish some of the aims of Phase III, a Workshop was organized jointly by NEERI and IRC in April 1983. An expert group consisting of research scientists/engineers and public health specialists from government departments as well as non-governmental agencies discussed the latest findings of the project. Arising out of the discussions, recommendations were made, which were subsequently discussed at the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support, that directly followed the Chief Engineer's Conference of June/July 1983. Both were held at NEERI, Nagpur.

The aim of both the Workshop and the Seminar was to work towards an integrated plan of action for effective improvement of the health status of the community, and thus of the quality of life of people at village level.

With the conclusion of Phase III, the SSF project will be finalized by the end of the year 1983.

## 2.2. Basic objectives of the evaluation

The evaluation of the research and demonstration project "Slow Sand Filtration" (hereinafter called: SSF project) has the following basic objectives:

a. to appraise the effectivity, efficiency and significance of the project
b. to assess the suitability of the selected project approach
c. to make - on the basis of the present project evaluation - recommendations for the Research Programme of the Netherlands Development Cooperation.

A comprehensive check list, in the form of "topics for evaluation" for each of the phases II and III has been given in the Terms of Reference for the evaluation mission (see Appendix A).

## 2.3. Composition and methodology of evaluation mission

The Term of Reference indicated that the evaluation of the SSF project was to be restricted to India and should be centered on the SSF Seminar at NEERI, Nagpur, from June 29 to July 1, 1983. As far as possible the evaluation should be carried out in collaboration with the national project coordination institution (PCI), in the case of India: the National Environmental Engineering Research Institute (NEERI) at Nagpur, India.

Apart from Mr. R. Trietsch, of DHV Consulting Engineers, Amersfoort (The Netherlands), the evaluation mission therefore consisted of Mr. R. Paramasivam, Head of the Water Engineering Division of NEERI.

The present evaluation report is based upon the papers presented at the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support of July 1983, and its predecessor of April 1983, on the ensuing discussions and recommendations, on informal discussions with participants of the Chief Engineer's Conference and of the National Seminar, and on personal observations and experience of the mission members. Especially the intimate acquaintance of Mr. R. Paramasivam with the SSF project has contributed significantly to the evaluation.

Participants to the Chief Engineer's Conference and the National Seminar included Chief Engineers of all States, as well as senior engineers in charge of designs and information support of the State Public Health Engineering Departments, senior officials of the Central Public Health and Environmental Engineering Organization (CPHEEO) and of the Ministry of Works and Housing itself, the Director of the Central Health Education Bureau and senior officials of the State Health Engineering Bureaus, various other officials, representatives of non-Governmental organizations (NGOs) and of the organizing institutions: NEERI and IRC.

The mission members had extensive discussions with the Manager and the SSF Project Officer of the International Reference Centre for Community Water Supply and Sanitation (IRC), Messrs. H. van Damme and J.T. Visscher, as well as with representatives from the WHO Regional Office for South-East Asia in New Delhi.

In view of the restricted time allotted to the evaluation of the SSF project, it was decided not to incorporate field visits to SSF demonstration plants in the evaluation, other than the visit to Borujwada which formed part of the National Seminar's programme. It was considered that including such field visits would add disproportionally to the time and cost to be spent on the evaluation, the more so as each of the demonstration plants had already been visited by at least one of the mission members.

The contribution of Dr.Ir. E.W. Lindeijer, Water Supply Coordinator at the Royal Netherlands Embassy, that had been foreseen in the Terms of Reference, unfortunately could not be realized because of a sudden illness that prevented him from returning to India in time for the Seminar and subsequent discussions.

# 3. EVALUATION OF PHASES II AND III

As was stated in Chapter 2 "Introduction" a comprehensive check list for the appraisal of phases II and III has been given in the Terms of Reference (Appendix A). With some minor deviations this check list has been followed in evaluating the impact of phases II and III, as mentioned in the following paragraphs.

## 3.1. International organization

In the set-up of the SSF project, with research and demonstration plants being spread over a number of countries, the main initiating and coordinating task rests with IRC. Since the present evaluation is restricted to India, only those aspects of the international organization that relate to the Indian component of the SSF project are mentioned in this report.

### Coordination

Coordination of the SSF activities by IRC has been experienced as quite satisfactory by the Indian "Programme Coordinating Institute", viz. NEERI. Contacts through correspondence between NEERI and IRC were good and prompt. From the side of NEERI it was mentioned, however, that - in addition to this - a more frequent direct contact between the PCIs in the various participating countries would have been desirable. As it is, two plenary sessions have been held in which technical representatives of all PCIs were present, i.e. at Voorburg in 1976 and at Nagpur in 1980. It was felt that, over a period of more than 6 years, at least one more meeting of the technically oriented members of all PCIs could have been organized. In that way a more direct exchange of information and ideas might have been realized.
In the opinion of Mr. R. Paramasivam of NEERI, representatives of the various PCIs should have had the opportunity to visit each of the other participating countries, as this would have provided them with a much more realistic impression of the situation in the other countries than could be obtained now.
It was recognized, however, that the availability of funds might have been a constraint in realizing this.

The mission recognizes the validity of the suggestions made, but is not in a position to judge their financial implications.

### Promotion of TCDC

NEERI feels that the SSF project has contributed significantly to the technical cooperation between developing countries. The meeting at Nagpur, of September 1980, in which representatives of the health and engineering sectors of all participating countries (except the Sudan) took part, was felt to be a major step in this respect.

A spin-off of the SSF project was the participation of NEERI representatives in the first Regional Conference of the International Water Supply Association (IWSA) in Singapore (1979), and in a seminar in Cameroon (1981) that had been organized jointly by IRC and the Ministry of Agriculture & Community Development.
Furthermore, a NEERI representative is scheduled to present papers on slow sand filtration experience in India, at the September 1983 seminar in Jamaica.

Summarizing, the conclusion can be drawn that the SSF project has indeed contributed to a stimulation of the contacts between the various countries involved, regarding technical and health-related aspects of water supply and sanitation, both directly and through IRC.

Problem identification
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Problems of an administrative or cooperational nature have not arisen. As far as the identification of possible constraints in the cooperation between the various institutions and governmental departments and agencies is concerned, these could be handled by the national PCI (in this case NEERI), with the support of IRC. Regarding the identification of potential problem areas of a technical nature, where research would be required, proposals have come forward from NEERI as well as from IRC, and such research items have been incorporated in the project after mutual consultation. As a rule, therefore, these aspects could be handled to the satisfaction of all concerned.

Information request handling and information support
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Information request handling by IRC has been very good, as was to be expected, since it is one of its most important tasks. Similarly, NEERI feels that the support, by IRC, with SSF-related information from other countries and agencies, has been excellent. The decision to entrust IRC with the coordination of the SSF project can only be complemented, as few institutions are in such a favourable position to collect and disseminate information related to water supply and sanitation from all over the world.

PCI's opinion on project set-up
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The NEERI staff generally felt that the selected set-up was a good and stimulating one. It was also felt, however, that a more intense linkage with the Regional WHO office in New Delhi might have been desirable, both directly and through IRC. It was felt that the project could have benefitted from interlinking with projects that are carried out in India by WHO. Also certain administrative difficulties might have been solved easier if a more direct relation with the WHO Regional Office had existed.

The mission is not in a position to judge the advantages and disadvantages of such a more direct involvement of the WHO Regional Office, and recommends that IRC take up this matter directly with NEERI and said Regional Office.

## 3.2. National organization

### Programme Coordinating Institute

Coordination and management of the SSF project in India have been in the hands of NEERI, as the Programme Coordinating Institute (PCI). In principle, a number of institutions might have been selected as PCI, e.g. the Central Public Health and Environmental Engineering Organization of the Ministry of Works and Housing in New Delhi, and various university research institutes.
Since the task of the PCI requires that it is able to perform research, to disseminate the results of that research through seminars and publications, and to advise on the set-up and operation of pilot and demonstration plants, NEERI was the obvious choice as the Indian PCI, being a renowned research institute regarding water supply and other environmental engineering aspects, with zonal laboratories in various parts of the country, with direct connections to Government agencies, Public Health Engineering Departments, universities and technical training colleges, and with a well-established information system. It is also well geared for organizing large-scale seminars and workshops, as was amply demonstrated during the June/July 1983 seminar.

The CPHEEO, being the policy making organization in water supply and other environmental engineering matters at National level, plays an important role in the Project Management Committee.

### Project Management Committee

The main purpose of establishing a Project Management Committee at national level is to improve and promote collaboration between governmental authorities, ministeries, research institutions and executing agencies concerned with water supply and sanitation.

The Project Management Committee (PMC) for India consisted of representatives of the following organizations/institutions:

1. Adviser - Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Works & Housing, Govt. of India.
   (Representative of the Government of India and main policy making body regarding water supply and other environmental engineering aspects.)

2. Director & Scientists, National Environmental Engineering Research Institute (NEERI), Nagpur.
   (Coordination of SSF programme; research and development.)

3. Chief Public Health Engineers of the States of Andhra Pradesh, Haryana, Maharashtra and Tamil Nadu.
(Construction of village demontration plants, with technical support from NEERI.)

4. Director, Central Health Education Bureau (CHEB), Ministry of Health & Family Welfare, Govt. of India.
(Implementation of community education programme, in collaboration with the state health departments of Andhra Pradesh, Haryana, Maharashtra and Tamil Nadu.)

5. International Reference Centre (IRC) for Community Water Supply and Sanitation, The Hague, The Netherlands.
(Over-all coordination of international SSF programme.)

The PMC met approximately five times in all, and especially during phase II of the project it has been instrumental in securing collaboration between the engineering- and health-oriented agencies at national and state level. In this respect India can hardly be compared with the other countries that participate in the SSF project, because of its sheer size and complexity of the Government structure. The Indian PMC might, therefore, be considered a supra national rather than a national body, with the tasks normally allotted to the national PMC now being delegated to Advisory Committees at the State level.
The Indian PMC, finally, has played a major role in assuring that the designs and budgets for the water supply schemes and SSF plant in the four demonstration villages, were officially sanctioned within a comparably short time.
In order to directly stimulate community education and participation in the selected demonstration villages, similar advising groups have been formed at District, Block and Village level, reflecting the Indian Governmental structure.

Generally speaking, the project strategy was determined at the highest levels (Project Management Committee and Advisory Committee at State level, with the lower level advisory groups, especially at village level, being concerned mostly with the day-to-day project activities.

In retrospect, this set-up has proven to be workable. A simpler set-up, e.g. dispensing with advisory groups at intermediate levels between State and village level, although seemingly able to speed up procedures, most probably would not have succeeded as it would have deviated from the traditional Indian governmental structure.

## 3.3. Technical feasibility of the project

### Acceptance of SSF as feasible for rural water supply

Slow sand filtration has been practiced in most Indian States, and in a number of them this technology has been used up to this moment, thereby

demonstrating its feasibility under practical conditions. The specific aim of the project in India has, therefore, been to prove to those members of the engineering profession who regard slow sand filters as outdated that this treatment method is ideally suited for treating low-turbidity surface waters in rural areas, that slow sand filters erroneously have been considered to be expensive and that the attributed malfunctioning of these filters in most cases is the result of incorrect operational procedures.

The research and development work carried out by NEERI, as well as the village demonstration plants, have shown that SSF is feasible for rural water supply, and this has been acknowledged by the local experts.
The results of the research and development work have been brought to the attention of representatives of all Public Health Engineering Departments in the various States, especially through the National Seminar of June/July 1983 in Nagpur.

Although it is too soon to assess the total impact of this seminar, it can safely be stated that it has been a major step forward in reinstating slow sand filtration as an accepted and up-to-date water treatment technology.

Description of various possibilities for construction
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The various options for constructing slow sand filters for rural water supply have been extensively covered in IRC's Technical Paper No. 11 "Slow Sand Filtration for Community Water Supply in Developing Countries" by J.C. van Dijk and J.H.C.M. Oomen (Ref. 2). This manual, which incorporates the findings of the SSF project up to the end of 1978, is under revision and is expected to be issued in a revised version before the end of 1983.

Attention paid to solving possible constraints/stimulation of research and development
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Under the Indian circumstances the major constraints for application of SSF are its inability to treat other than relatively low-turbidity waters without pretreatment, but especially the misconception that slow sand filters are an expensive treatment method.

A questionnaire survey was held by NEERI at the beginning of the project, in order to obtain information on actual experiences with slow sand filters in India, and to identify possible constraints and areas of future research and development.
Research and development activities undertaken by NEERI can be summarized as follows:

a. determination of the applicability of SSF by investigating:
   - raw water quality (turbidity and bacteriological pollution) versus plant performance
   - effect of organic pollution in raw water on plant performance
   - influence of shading the filters
   - efficiency of virus removal

b. research on aspects that would result in a reduction of investment costs:
   - effect of filtration rates higher than the traditional 0.1 m/hr
   - effect of reducing the filter bed depth
   - effect of replacing outlet control by inlet control
   - possibilities for prefabricating SSF elements or units, especially for small communities
   - effect of reducing underdrain system height by using perforated filter bottoms

c. research on aspects related to operation and maintenance of SSF:
   - effect of intermittent operation
   - effect of declining rate filtration

The results of most research items have been published in the Final Report "Slow Sand Filtration" 1982 (Ref. 19), whereas others will be published during the second half of 1983.

In the mission's opinion, suffient research and development has been carried out by NEERI, but increased attention should be given to the cost aspects of slow sand filtration (especially including a sensitivity analysis of the break-even point of treatment systems including slow sand filtration and systems including coagulation, sedimentation and/or rapid sand filtration) and to possible pretreatment methods.

No additional research activities need to be undertaken, but these items need to be highlighted in future publications and reports. Information on feasible pretreatment methods and costs may be derived from experience with horizontal roughing filters in Thailand and Colombia.
Furthermore, future publications might emphasize the large number of villages (estimated at 20,000) in India, where SSF without pretreatment would be feasible because of the relatively low raw water turbidities.

## 3.4. Community education and participation (CEP) and heath education (HE)

### Development and application of CEP models

Community education and participation activities started simultaneously with construction activities for the SSF village demonstration plants.

The health education strategy was developed by the Central Health Education Bureau and implemented by the State Health Education Bureaus. A uniform approach was followed for all 4 demonstration villages:

- collection of information regarding the village, educational requirements, facilities and amenities available, etc., through standard pro formas
- collection of baseline data regarding community awareness of health aspects
- formation of advisory and action groups at various levels
- formation of welfare-cum-health committee at village level
- orientation training of community health workers, formal and informal leaders and school teachers ("training the trainers")
- organization of educational activities: mass meetings, group meetings, individual contacts, exhibitions, film shows, displays of posters, mottos, etc., immunization campaigns, latrinization campaigns
- periodical doctor's visit and medical examination of children
- collection of data regarding community awareness of health aspects afterwards
- evaluation

Community participation regarding the water supply system of necessity was of a much more limited nature, as the design of the scheme and the selection of slow sand filtration as the treatment system had already been decided upon, by the nature of the project. The CEP activities were, therefore, mainly intended to introduce the SSF concept with the villagers, to have them participate in or contribute to the construction and O & M of the SSF plant, and to educate them so as to derive the maximum possible benefit from the new SSF treatment plant.

During the planning and design stage, the CEP component was in fact limited to informing the villagers of the advantages and benefits the community would derive from implementing the SSF plants. Decisions on the source of raw water (in case options were available), the location of the SSF plant and of the public stand posts were taken in consultation with the community, though not always to everyone's satisfaction.

Construction of the plants was done by contractors, so the community's contribution here was a financial one: since none of the demonstration villages was a "problem village" according to the prevailing efficial guidelines *), cash contributions by the villages were required.

Note *): "problem villages" according to the current Government guidelines are villages where:

- depth to water table exceeds 15 m, and/or
- source dries up in summer, and/or
- water is oily, brackish or contains excess fluorides (more than 1 mg/l), and/or
- distance to source exceeds 1.6 km (in hilly areas).

("Problem villages" - for which full government funding would have been available - where SSF could have been applied, and within a reasonable distance from NEERI and other relevant agencies in order to successfully act as a demonstration village, could not be identified in time. Moreover, it was expected that procedures for designing and implementing water supply systems in those villages would cost too much time to fit into the SSF project schedule.) In addition, in some cases land for the construction of the SSF plant was made available for a nominal sum only.

Community participation in O & M of the SSF plants is limited, as the plants are operated in the traditional say, i.e. under the responsibility of the village panchayat or the public health engineering department, depending on the situation.
Only in Borujwada (Maharashtra State) the plant operator is a local person who has been involved with the SSF plant from the start of its construction, and who was appointed by the villagers themselves. O & M of this plant is paid from the interest of the financial contribution of Rs. 50,000 from the IRC, which is kept in a bank as a long-term deposit. The fact that the village was able to persuade the State authorities to deposit this money, that normally should have been handed over to the State, and to use the interest for meeting the O & M costs can hardly be called community participation, however.

In conclusion, it can be said that the community education was mainly in the shape of an extensive health education programme, in which water supply was incorporated.
The project has been able to demonstrate that a multi-disciplinary and inter-agency approach of community health education can contribute significantly to the community's perception of the importance of health, hygiene, sanitation and a good water supply.
It has been able to make the technical and health-oriented agencies at the lower government levels more aware of each other's activities, and has secured the provision of water a much more important place in health education, which formerly tended to be concentrated on family welfare and immunization campaigns.

Although a uniform set-up for health education had been developed and applied it cannot really be termed a CEP model. Not only were the community's possibilities to participate rather restricted in as far as the water supply scheme is concerned, the fact that a contribution of Rs. 50,000 per demonstration plant was donated through IRC is not a normal situation either, thus complicating the picture.
Finally, it may be expected that the input of the various government agencies in the CEP/HE campaigns around these demonstration plants has been disproportionately large, and that it may prove impossible to replicate these efforts on a larger scale.

It is for this reason, and because of the major role non-government organizations (NGOs) could play in CEP/HE, that the mission strongly supports the proposal to compare the health impact of different approaches of improved water supply and sanitation, as presented by IRC at the National Seminar (see Appendix F).
The proposal has been discussed by the Working Group on CEP/HE at the National Seminar and is under consideration with the Director of the Central Health Education Bureau in New Delhi. Initially, this study might be restricted to the four states where the SSF demonstration plants have been constructed and the CEP/HE activities as described earlier have been carried out.

Development of tools for further CEP

During the CEP/HE campaign as described above, varous tools have been used and developed, which could be used in further CEP activities. These educational aids, all of which have been prepared in the local languages, comprise:
recorded dialogues, health songs, posters, pamphlets, roll charts, models, panels, flash cards, table-tops, slogans, movies, slide series, etc.

Participation by the communities/Satisfaction with results?

Notwithstanding some initial difficulties, over-all participation by the communities generally has been very good. In all villages the awareness of the importance of personal hygiene and the knowledge regarding water-borne and water-related diseases has grown considerably. In all villages the people participated in the decision-making with regard to the location of the SSF plant and was this plant accepted as a source of drinking water (the evaluation questionnaires show that at least 80% of the population was satisfied with the new SSF plant).
Participation regarding the water supply system itself has been unsatisfactory in at least one case (Kamayagoundanpatty in Tamil Nadu) (Ref. 23 ix), although the reason for this had nothing to do with the SSF project as such, nor with the connected health education and community participation activities. Although the health staff in this village has been able to build up a considerable report with the villagers in spite of limited financial means, relations between the villagers and the technical staff in charge of the already existing water supply system deteriorated because the system was not able to produce sufficient quantities of water, due to a number of constraints. These were of a technical nature, including frequent power cuts, but also due to the unwillingness of the local panchayat to erect more public standposts and to distribute these equally over all groups of the population.

In Indian rural water supply practice, the majority of the water supply schemes, though designed and constructed under the responsibility of the State Public Health Engineering Department, once commissioned, are handed over to the local panchayat for operation and maintenance.

As the water supply system in Kamayagoundanpatty was an existing one, to which only the SSF plant was added, the responsibility (and power) of the PHED was restricted to the SSF plant. The SSF project had, therefore, no means whatsoever to enforce an extension of the distribution system or the construction of additional standposts.
Had the distribution problem been known in advance, the village might not have been selected, but since CEP/HE components were added to the project at a later stage only, the decision to select Kamayagoundanpatty had already been made.

Acceptability of concept for engineers

The experiences in the demonstration plant villages and during the National Seminar of June/July 1983 indicate that there is a growing awareness amongst the engineers that CEP/HE contribute favourably to the success of improved water supply systems. The CEP/HE concept followed in the demonstration plant villages was clearly acceptable to the technical staff involved.

Also in the Government of India's Master Plan for Water Supply and Sanitation Sector (April 1981 - March 1991) (Ref. 22) the importance of health education and community participation is highlighted.

During the National Seminar CEP was clearly accepted by the engineers, though the mission's impression was that most engineers consider CEP to be part of the over-all health education package, to be implemented essentially by health-orientated agencies and/or NGOs.

Exchange of ideas between health specialists and engineers

Exchange of ideas between health specialists and engineers has clearly been encouraged by the SSF project. Several inter-agency meetings have been arranged, starting from July 1978. Health specialists and engineers have been able to effectively exchange ideas at various levels, from national level (PMC) to village level. Especially during the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support of June/July 1983, senior engineering and health staff of all Indian States has been able to exchange ideas, with the result that at central and state level the connection between water supply and health education has been officially recognized. This is reflected in the recommendations of the National Workshop of April 1983 and of the National Seminar of June/July 1983, as well as in the Government of India's Master Plan for the water supply and sanitation decade (Ref. 22).

Stimulation of connecting health education

It has been mentioned before that the health education campaign in the four demonstration plant villages had been set up as a comprehensive

programme, including not only water supply aspects, but all relevant health aspects. In addition, health education in the form of a latrinization programme has taken place in Borujwada, whereas the use of latrines has been stimulated in the other demonstration plant villages.

## 3.5. Operational and Maintenance (O & M)

### Development of O & M models

"Guidelines for Operation and Maintenance of Slow Sand Filtration Plants in Rural Areas of Developing Countries" and an accompanying "Trainer's Guide" have been published by IRC in January 1983 (Ref. 20 and 21). These contain a description of the slow sand filtration process and plant, O & M procedures, a job analysis for SSF plant operators, a training syllabus, instruction plans on background knowledge and instruction plans on operation jobs, with pro formas for training records.

Limited numbers of the "Guidelines" and "Trainer's Guide" have been sent to the National Programme Coordinating Institutes (for India: NEERI), for comment and for possible use, after translation wherever necessary, in national or regional training programmes.

### Development of training programmes for O & M

Village-level local operators are operating the SSF demonstration plants. They have been trained on-the-job, by the relevant Public Health Engineering Department, with the support of NEERI.
No formal training programmes have been developed yet, but a proposal for the development of an appropriate training method for operators of SSF plants in rural areas has been handed over by IRC to representatives of the Public Health Engineering Department of a number of states, especially those where water supply projects are funded with Netherlands development aid (see Appendix G).

## 3.6. Dissemination of results

### Target group reached at seminars?

Under the Indian conditions the following target groups can be identified:

a. Chief Engineers of the Public Health Engineering Divisions of the various states, being the technical decision-making bodies at state level
b. senior engineering staff of the various PHED, in charge of designs, and thus ultimately responsible for the drafting of plans and tender documents (which so far often prescribed rapid sand filters (e.g. pressure filters) where slow sand filters would have been better suited)
c. Directors and senior staff of Health Education Bureaus.

Representatives of the categories a and c have been intensively involved, as far as the states of Andhra Pradesh, Hariyana, Tamil Nadu and Maharashtra are concerned, since the demonstration plants and connected CEP/HE activities were restricted to these states.

All these groups have been reached at the Chief Engineer's Conference and the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support of June 27 - July 1, 1983 at Nagpur.
With a total of approx. 160 participants it can be stated that the target group has indeed been reached at these seminars.

Other forms of dissemination

Apart from the abovementioned National Seminar, also other seminars have been used to disseminate the results of the Indian SSF project component:
- First Regional Meeting of IWSA, in Singapore, 1979
- Seminar in Cameroon (1981)
- Commonwealth Science Council Workshop at Madras, May 1982
- 13th Annual Convention of the Indian Water Works Association, Pune, January 1981.

Moreover, a large number of publications on SSF have been prepared, most of which are listed in chapter 6 ("References").

These include reports issued by NEERI and/or IRC (Ref. 1, 2, 4, 7, 19) of which especially Technical Paper No. 11 (Ref. 2) has been distributed by NEERI to all engineering departments, libraries of universities and engineering colleges, etc., reports by the Central Health Education Bureau (Ref. 15, 16), reports of and papers presented at workshops and seminars (Ref. 8, 13, 17, 23) and publications in professional journals including AQUA, the Journal of the American Water Works Association, the Journal of the Indian Water Works Association, the Indian Journal of Environmental Health, etc. (Ref. 3, 5, 6, 10, 11, 12, 14).

Finally, NEERI gives 4 SSF-orientated lectures during the annual course at VRCE Regional College of Engineering, which is attended by up to 15 practising engineers from all over the country.

Spin-offs of the SSF project

The following can be named as spin-offs of the SSF project:
- a recommendation to adapt the text of the Ministry of Works and Housing's "Manual on Water Supply and Treatment" to the latest findings regarding the feasibility, construction and operation of SSF plants
- the catalytic role of the demonstration plant villages on the neighbouring villages

- sanitation/latrinization programmes in some of the demonstration plant villages
- additional international recognition of the Programme Coordinating Institute (NEERI)
- the establishing and strengthening of contacts and collaboration between engineers, health specialists and non-government organizations
- the creation of an awareness within the communities of the demonstration plant villages that they can be benefitted in many more areas, provided that some effort and contribution from their part is made.

Requests for information/publications

NEERI has received a large number of requests for information and/or publications on slow sand filtration from water supply organizations, medical officers, government agencies, consultants and others, from the following countries:

- Bangladesh
- Sri Lanka
- Nepal
- Pakistan
- Thailand
- Mauritius
- Tanzania
- Kenya
- Denmark
- Israel
- Switzerland
- South Africa
- Australia
- Canada
- French Polynesia

In addition, IRC has distributed the following information on SSF all over the world:

| | | | |
|---|---|---|---|
| Technical Paper No. 11 (Ref. 2) | (in English) | : approx. | 2,500 copies |
| | (in French) | : approx. | 1,000 copies |
| | (in Spanish) | : approx. | 500 copies |
| Bulletin No. 16 (Ref. 17) | (in English) | : approx. | 1,000 copies |
| Leaflet on slow sand filtration | (in English) | : more than | 5,000 copies. |

Introduction of SSF in university programmes

Slow sand filtration, albeit not yet reflecting the results of the recent research and development, is already a part of the curriculum of many universities. As was mentioned earlier, Technical Paper No. 11 (Ref. 2) has been sent to all universities and technical colleges. As, moreover, these educational institutions are often represented in the Research Advisory Committee of NEERI, it is expected that the results of the SSF project will find their way into the University curricula in due course. These is no feedback yet that this has already happened, however.

Technical Paper No. 18 (Ref. 24), which also incorporates up-to-date information on SSF, is scheduled to be printed commercially in the near future. It is expected that, as a result of this, this book will be used extensively as a text book.

## 3.7. Promotion of slow sand filtration in National Plans

During the Chief Engineer's Conference of June 1983, and the subsequent National Seminar, the case for slow sand filtration has been presented very strongly. As has been stated before, the policy level could be reached at this occasion, and it is expected that the attitude towards slow sand filtration has changed favourably.

Although it was proposed by several participants to mention slow sand filtration explicitly in the recommendations of the Chief Engineer's Conference, in the end it was decided that, since no type of treatment was mentioned specifically in the Master Plan for the Water Supply and Sanitation Sector, a recommendation on SSF could not be incorporated either. Thus, the preliminary recommendations of the Chief Engineer's Conference (Appendix D) do not contain any reference to slow sand filtration.

## 3.8. Support for obtaining funds

Donor agencies in India (e.g. LIC) and abroad (international donors and bilateral donor agencies) have been informed on the progress and results of the SSF project either through NEERI or through IRC. Working relations between the sector agencies in India and the donor agencies do exist, but are in general not related to SSF.
On the other hand, a definite preference for appropriate and reliable water supply systems is materializing with the donor agencies, so that slow sand filtration nicely fits in that picture.

There is no feedback yet indicating a special interest of donor agencies in slow sand filtration as expressed in concrete project proposals.

## 3.9. Rehabilitation of slow sand filters

No plans for the rehabilitation of slow sand filters in India have been drawn up yet. NEERI proposes, however, to evaluate SSF plants that have failed in the past or that are performing below expectation, in order to find out whether this is due to

- faulty design
- incorrect operation and maintenance
- a combination of the two
- other reasons

and to indicate measures to be taken to upgrade plant performance.

This evaluation has not yet been carried out, but is planned for the remaining part of Phase III.

# 4. EVALUATION OF THE RESEARCH PROGRAMME OF THE NETHERLANDS DEVELOPMENT COOPERATION (on the basis of the present project evaluation)

## 4.1. Desirable modifications of the criteria of the programme

No modifications of the criteria of the Research Programme can be recommended on the basis of the present project evaluation.

## 4.2. Desirable adjustments of the programme procedures

Since the mission has become involved in the SSF project only near its end, it is not in a position to judge whether adjustment of the programme procedures with respect to the project preparation and assessment would have been desirable.

With respect to the execution of the project, the set-up whereby the SSF research has been spread over a number of countries, under the coordination of the IRC, appears to be a realistic and efficient one.
As has been stated earlier, the selection of the IRC as the central coordinating body and of NEERI as the Indian PCI, appears to be a favourable one in both cases. Because of IRC's routine in coordinating water supply projects in a number of countries, monitoring by the Section for Research and Appropriate Technology of the Netherlands Development Cooperation could be restricted to a minimum. Monitoring of the Indian contribution to the SSF project, according to information obtained from IRC, amounted to an average of 2 man-months per year, inclusive of an average of two visits to India, which is considered reasonable.

Summarizing, no adjustments of the programme procedures with respect to the SSF project are recommended.

# 5. CONCLUSIONS AND RECOMMENDATIONS

## 5.1. Evaluation of Phases II and III

### International and national organization of the project

Judged from the experiences of the Indian project component, the set-up whereby IRC acts as the over-all coordinating agency between the participating countries, with NEERI as the Indian Programme Coordinating Institute (PCI) has proven to be advantageous. Aspects of coordination, promotion of TCDC, problem identification, information support, have been dealt with to the satisfaction of all concerned.

The Project Management Committee has been instrumental in securing the collaboration of health experts and engineers at national and state level for the required interaction of water supply and CEP/HE activities, as well as in sanctioning the construction of the SSF plants and connected water supply systems in the four participating states.

Only with respect to international contacts the PCI would have preferred a slightly more frequent contact between the representatives of the participating countries, preferably including the possibility to visit each others' country for a more direct confrontation with the local situation. Similar opinions have been voiced during the conference of September 1980. Apart from a certain understandable desire to travel to other countries, such direct contacts may indeed prove beneficial, as was demonstrated during Mr. R. Paramavisam's visit to Kenya, en route to the seminar in Cameroon.
The mission is not in a position, however, to judge the practicability of such international contacts from a financial point of view.

### Technical feasibility of the project

The research and development work that has been carried out clearly illustrates that SSF is feasible for rural water supply, and acceptance of that idea is growing in India. The various possibilities of SSF construction have been described in detail, and all relevant aspects of SSF design and operation including several innovative techniques have been covered, although reporting on certain aspects still has to take place. The mission recommends that the financial aspects of slow sand filters, as well as the consequences for treating water with higher turbidities are reported in more detail.

### Community education and participation (CEP) and health education (HE)

A community participation/health education campaign has been carried out in phase II of the project, in each of the four villages where SSF demonstration plants were to be constructed, with the main objective to have the local population derive the utmost benefit from the new slow sand

filtration plant. These campaigns covered all health education aspects, including those related to water supply. Community participation regarding the water supply system itself was of necessity restricted, since the treatment method had already been decided upon from the start.
Thus, the bulk of the activities were related to the health aspects, and the health experts have, therefore, played a major role. The direct participation of the community in the construction of the water supply system was limited to a financial contribution. The project did not have any influence regarding construction activities other than those related to the SSF, as a result of which the purpose of the CEP related to the water supply system was at least partly defeated in Kamayagoundanpatti (Tamil Nadu). There a sizeable part of the population could not profit from the treated water, as the local panchayat refused to extend the distribution system and increase the number of public standposts.

Thus, although being successful in as far as the health education aspect was concerned, other factors, beyond the control of the SSF project, prevented the CEP/HE campaign from becoming entirely successful.

The situation where the decision to start a CEP/HE campaign has been taken at a later phase of the project, when the technical details had in fact already been decided upon, nessessarily ressembles the "selling of a product" (in this case SSF), albeit with the best of intentions, rather than a real community participation from the bottom upward. In the latter case, however, there is another problem, the "chicken-egg" situation as mentioned in one of the papers on community participation and health education (Ref. 2.3. vii):
"Health education depends for its effectiveness on community involvement. "It is a "chicken-egg" situation. One cannot happen before the other. Do "you spend money on creating facilities that people do not want and prob- "ably will not use, just so that you can educate people slowly to begin "to use them? Alternatively, can you educate in the absence of facilities, "until you have created a consumer demand?"

The strategy developed for CEP/HE in Phase II of the project cannot, therefore, be considered a model for water supply-related activities, also because it would most probably not be practicable to replicate these activities on a larger scale.
The mission therefore supports the proposal that was presented at the National Seminar by IRC, and that seeks to compare the health impact of *different approaches of improved water supply and sanitation* (Appendix F). It also aims at investigating the possibilities of involving non-governmental organizations (NGOs) in CEP/HE aspects. That NGOs can play a very important role in this respect has been shown by Dr. (Mrs) Arole of the Jamked project.
The abovementioned proposal might, initially, be restricted to the four states that also participated in the demonstration plant phase.

Operation and maintenance (O & M)

Guidelines for the O & M of SSF plants have recently been distributed by IRC for comments and use by the PCIs. No formal training programmes for SSF-related O & M have been developed, however, and IRC has submitted a proposal for the development of an appropriate training method for SSF plant operators (Appendix G).
In principle the mission supports this proposal, but it feels that attention must be paid to not intervene with existing or planned training courses or to put a disproportionate emphasis on slow sand filtration as compared to other water supply subjects.
Since it is the intention to execute the appropriate training development programme initially in those States where Netherlands-aided water supply projects are under construction, a role could be played here by the Water Supply Coordinator at the Royal Netherlands Embassy.

Dissemination of results

Especially the combination of the Chief Engineers Conference and the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support from June 27 to July 1, 1983 has enabled the SSF project to reach the desired target group of policy makers, senior engineering and health staff. The question might be raised why the results of the SSF project have not been presented at a National Seminar earlier, thus allowing for consolidation of the progress made during the remainder of Phase III. The answer to that is that a combination of the National Seminar with the Chief Engineer's Conference could not be realised sooner, and that without this combination the impact would have been considerably less, as it must be expected that the attandance by Chief Engineers of a National Seminar on SSF alone would have been considerable lower.

In addition, dissemination of the results of the project has taken place through participation in other conferences and seminars, by publishing reports, papers and publications in professional journals, and by replying to requests for information from in- and outside India.
Because of NEERI's connections to various universities, it is expected that in due course the university curricula on water treatment will be adapted to incorporate the revised views with regard to slow sand filtration.

Promotion of slow sand filtration in National Plans

Though not mentioned in the preliminary recommendations of the Chief Engineer's Conference, SSF has been brought to the attention of the representatives of the Ministry of Works and Housing and the Chief Engineers of all States, and from the discussions during te conference it is apparent that slow sand filtration, together with other appropriate technologies, will get due attention in the implementation of the Master Plan for the Water Supply and Sanitation Sector (Ref. 22).

Support for obtaining funds

Donor agencies have been informed about the results of the SSF project by both NEERI and IRC, but as yet there is no feed-back indicating that this has resulted in concrete projects.

Rehabilitation of slow sand filters

An evaluation of existing SSF plants aimed at discovering the reasons for unfavourable results, if any, and at indicating measures to upgrade plant performance will be carried out by NEERI in the remaining part of Phase III.

## 5.2. Evaluation of the Research Programme of the Netherlands Development Cooperation

No modifications of the criteria of the Research Programme or adjustment of the programme procedures with respect to the SSF project can be recommended on the basis of the present project evaluation.

## 5.3. Final remarks

The over-all conclusion of the evaluation mission is that the project has been successful.
The feasibility of slow sand filtration for water supply in rural areas has been sufficiently demonstrated. However, the remaining part of Phase III is not sufficiently long to drive the message home and to consolidate the progress made. It is recommended, therefore, that NEERI and IRC continue promoting the application of slow sand filtration also after the conclusion of Phase III, with the support of the Water Supply Coordinator at the Royal Netherlands Embassy. This might take the form of a Phase IV to the project, albeit with a considerably reduced input in terms of man-months, possibly in combination with additional CEP/HE and O & M activities as proposed in Appendices F and G.

## 6. REFERENCES


1. "Slow Sand Filtration Project Report - Phase I"
National Environmental Engineering Research Institute, Nagpur (India), December 1977.

2. Van Dijk, J.C. & Oomen, J.H.C.M.
"Slow Sand Filtration for Community Water Supply in Developing Countries" - A Design and Construction Manual
WHO IRC Technical Paper No. 11, December 1978.

3. Damodara Rao, T.; Sangili Raj, N.; Sellappa, S.
"A Slow Sand Filter with Pre-treatment at Kamayagoundanpatti in Tamil Nadu"
J. Indian Wat. Works Assn. 11, 1, 133, (1979).

4. "Community Education & Participation in the Slow Sand Filtration Programme in India" - An Interim Review WHO IRC, June 1979.

5. Paramasivam, R. & Sundaresan, B.B.
"Slow Sand Filters for Rural Water Supply in Developing Countries"
AQUA, 3, 13, (1979).

6. Paramasivam, R.; Joshi (Miss), N.S.; Dhage (Mrs), S.S.; Tajne, D.S.
"Effect of Intermittent Operation of Slow Sand Filters on Filtered Water Quality"
Indian J. Environ. Hlth. 22, 2, 136, (1980).

7. "Status Report on Slow Sand Filtration Project in India"
National Environmental Engineering Research Institute (NEERI), Nagpur (India), Septemer 1980.

8. Slow Sand Filtration for Community Water Supply in Developing Countries.
Report of an International Appraisal Meeting, Nagpur, India, September 15-19, 1980, IRC Bulletin Series 16, March 1981.

Papers presented at the above meeting

(i) Paramasivam, R. & Mhaisalkar, V.A.
"Design & Construction of Slow Sand Filters"

(ii) Raman, A. & Haraprasad, V.
"Operation & Maintenance of Slow Sand Filter Plants"

(iii) Heijnen, Ir. H.A.
"Training of Operators of Slow Sand Filter Plants"

(iv) Muir, B.L.
"Base-line Health Survey"

(v) White, Dr. A.T.
"Community Participation"

Background papers for the above meeting

(i) Raman, A.; Gurdeep Singh & Nagpal, J.L.
Observations on Operation & Maintenance of Village Demonstration Plant on Slow Sand Filtration at Abub Shahar, Haryana.

(ii) Raman, A.; Gurdeep Singh & Nagpal, J.L.
Observations on Design & Construction Aspect of Slow Sand Filtration Demonstration Plant at Abub Shahar, Haryana.

(iii) Murthy, U.R.K.; Kondale Rao, R. & Subbarao, V.
Experiences in the Design, Construction & Operation of Slow Sand Filters at Pothunuru, Andhra Pradesh.

(iv) Ghosal, B.C. & Bawa, P.S.
Health Education Service Programme in Village Borujwada, Maharashtra, An Action Research Study.

(v) Ghosal, B.C.; Hiramani, A.B. and Bawa, P.S.
Health Education & Community Participation in Slow Sand Filtration Project in India - Phase II - An Action Research Study.

(vi) Saxena, G.G.
Health Education Programme on Slow Sand Filtration in Abub Shahar, Haryana.

(vii) Sumathi Rao, Dr. (Mrs)
Health Education Project, Kamayagoundanpatti, Madurai, Tamil Nadu.

(viii) Health Education Activities, Slow Sand Filtration Project, Pothunuru, Andhra Pradesh.

9. Wilde, K.Th. de
"Notes on the Slow Sand Filtration Project, on the occassion of the Conference at Nagpur, India, September 15-19, 1980" (in Dutch), October 1980.

10. Paramasivam, R. & Mhaisalkar, V.A.
"Slow Sand Filtration - An Appropriate Technology for Medium and Small Water Supplies"
J. Indian Wat. Works Assn., 13, 2, 173, (1981).

11. Dhage (Mrs), S.S.; Kelkar, P.S.; Joshi (Miss), N.S.; Tajne, D.S. and Paramasivam, R.
"Performance Evaluation of a Slow Sand Filter Plant"
J. Indian Wat. Works Assn. 13, 4, 335, (1981).

12. Paramasivam, R.; Mhaisalkar, V.A. & Berthouex, P.M.
"Slow Sand Filter Design and Construction in Developing Countries"
J. Am. Wat. Works Assn. 73, 4, 178, (1981).

13. Paramasivam, R. & Mhaisalkar, V.A.
"Slow Sand Filters for Safe Water in Rural Areas"
Paper presented at the Commonwealth Science Council Workshop on Rural Drinking Water Supply, NEERI, Madras, May 10-13, 1982.

14. Joshi (Miss), N.S.; Kelkar, P.S.; Dhage (Mrs), S.S.; Paramasivam, R. and Gadkari, S.K.
"Water Quality Changes During Slow Sand Filtration"
Indian J. Environ. Hlth., 24, 4, (1982).

15. Ghosal, B.C. & Bawa, P.S.
Health Education & Community Participation in Slow Sand Filtration Programme in Village Pothunuru, Andhra Pradesh, an Action Research Study, Central Health Education Bureau, D.G.H.S., Ministry of Health & Family Welfare, New Delhi (India), 1977-1982.

16. Ghosal, B.C. & Bawa, P.S.
Health Education & Community Participation in Slow Sand Filtration Programme in Village Borujwada, Maharashtra, an Action Research Study, Central Health Education Bureau, D.G.H.S., Ministry of Health & Family Welfare, New Delhi (India), 1977-1982.

17. "Report of a National Workshop Held in Nagpur (India), April 11-13, 1983", NEERI/IRC.

Papers presented at the above workshop

(i) "Slow Sand Filtration" - Final Report

(ii) Paramasivam, R.; Mhaisalkar, V.A.; Sundaresan, B.B.
"Economic & Cost considerations in Planning & Design of SSF System"

(iii) Ghosal, Hiramani & Bawa.
"Health Education & Community Participation in SSF Programme in India"

(iv) Arole, R.S. & Arobe, Mrs M.
"The Comprehensive Rural Health Project - Jamkhed"

(v) Sumathy Rao, (Mrs)
"Report on Health Education Project Kamayagoundanpatti, Madurai District, Tamil Nadu"

(vi) Saxena, G.G.
"Health Education Programme in SSF Project - Abub Shahar and Saktakhere group of villages, Dist. Sirsa, Haryana"

18. Sundaresan, B.B.; Khirsagar, R.S. and Paramasivam, B.
"Evaluation of Rural Water Supply Schemes in India", CPHEEO, NEERI, 1982.

19. Sundaresan, B.B. and Paramasivam, R.
"Slow Sand Filtration, Research and Demonstration Project - India, Final Report"
NEERI, IRC, 1982.

20. IRC, Research and Demonstration Project on Slow Sand Filtration
"Guidelines for Operation and Maintenance of Slow Sand Filtration Plants in Rural Areas of Developint Countries", IRC, January, 1983.

21. Ditto - "Trainer's Guide",
IRC, January, 1983.

22. Government of India
"Master Plan for Water Supply and Sanitation Sector (April 1981 - March 1991)" (Draft)
July 1983.

23. Papers presented at the National Seminar on Slow Sand Filtration, Health Education, Community Participation and Information Support, June 29 to July 1, 1983, and background papers.

(i) Visscher, J.T.
"The International Research and Demonstration Project on Slow Sand Filtration".

(ii) Paramasivam, R.; Mhaisalkar, V.A. and Sundaresan, B.B.
"Slow Sand Filtration - An Appropriate and Cost-effective Technology for Small & Medium Water Supplies in Developing Countries".

(iii) Raman, A.
"Operation and Maintenance Considerations for Slow Sand Filter Plants".

(iv) Murthy, U.R.K. and Kondala Rao, R.
"Slow Sand Filter Beds for P.W.S. Scheme at Pothunuru in west Godavari District, Andhra Pradesh (India)".

(v) Ghosal, B.C.
"Health Education and Community Participation in Slow Sand Filtration Project in India - An Overview".

(vi) Panicker, P.V.R.C.; Gadkari, A.S. and Talkhande, A.V.
"Slow Sand Filtration: Health Education and Community Participation in the Four Project Villages".

(vii) Subbegowda, H.B.
"Community Participation and Health Education.

(viii) Ramdasi, S.G.
"Maharashtra State Health Education Bureau, Pune".

(ix) Sumathy S. Rao
"Community Education and Participation - Health Education Project Kammayyakoundanpatty - Madurai District, Tamil Nadu".

(x) Bhat, S.G.; Kesarwani, S.K. and Sinnarkar, S.N.
"Information Support to Water Supply and Sanitation Programme in India - Problems and Prospects".

(xi) Rajagopalan, T.S. and Rajan, T.N.
"Personal Information File".

(xii) Misra, V.N.
"Resource Sharing and Networking with Special Reference to Water Information in India".

24. IRC, "Small Community Water Supplies; Technology of small water supply systems in developing countries", Technical Paper No. 18, September 1981.

APPENDIX A

GENERAL INSTRUCTION FOR THE EVALUATION OF THE INTEGRATED RESEARCH AND DEMONSTRATION PROJECT ON SLOW SAND FILTRATION (PHASES II AND III)

1. Introduction

The evaluation of the research and demonstration project "slow sand filtration" (hereafter called the project) which is being funded in the framework of the research programme of the Netherlands Development Cooperation is being carried out by order of the Netherlands Minister for Development Cooperation to provide a framework for review and further implementation of policy in this area.

2. Aims

Basis objectives for the evaluation are:
- to appraise the effectivity, efficiency and significance of the project
- to assess the suitability of the selected project approach
- to make - on the basis of the present project evaluation - recommendations for the Research Programme of the Netherlands Development Cooperation.

The evaluation will be based on the objectives of the project and the criteria of the Netherlands Research Programme (copies of both are attached), the pre-evaluation of Mr. de Wilde (ETC) in October 1980 (copy attached), the modifications following his observations and the integral project concept.

3.1. Topics for evaluation (phase II)

a. Technical feasibility
- Is SSF accepted as feasible for RWS (questioning local experts)
- Are various possibilities for construction described (publications)
- Is sufficient attention paid to solving possible constraints (publications research)
- Has adequate research and development been stimulated.

b. Community participation
- Have models for CEP been developed and successfully applied (publications and discussions with local experts)
- Have tools been developed for further CEP
- Did communities participate and are they satisfied with the results (self evaluation in the village)

- Is the concept acceptable for engineers
- Was exchange of ideas between health specialists and engineers encouraged and effective
- To what extent was connecting health education stimulated.

c. Operation and maintenance

- Have models for O and M been developed
- Have training programmes been developed (do village level local operators exist).

d. National Organization

- Programme coordinating Institutes (coordination/management)
- Project Managing Committees (PMC meetings, was collaboration between institutes in countries stimulated).

e. International Organization

- Coordination
- Promotion of TCDC
- Problem identification
- Information support to the countries
- Info request handling
- Stimulation (did the PCI's feel stimulated by set up).

3.2. Topics for evaluation (phase III)

a. Dissemination of results

- Is target group reached at seminars
- Which other forms of dissemination
- What spin-offs spun off
- Requests for info/publications
- Introduction of SSF in university programmes.

b. Promotion SSF in National plans

- Has national policy changed/been influenced (study of national plans)
- Is policy level reached.

c. Support for obtaining funds

- Interest donor agencies
- Developing plans for rehabilitation.

3.3. Topics for evaluation of the Research Programme of the Netherlands Development Cooperation

- Desirable modifications of the criteria of the programme
- Desirable adjustments of the procedures of the programme with respect to the project
  - preparation
  - assessment
  - execution
  - monitoring.

4. Organization

The information on the above topics will be obtained through participation in the SSF seminars and discussions with relevant national organizations. The present mission concerns the seminar in India (Nagpur) from June 28-30-1983.

As far as possible the evaluation should be carried out in collaboration with the national project coordinating institutions (in this case: The National Environmental Engineering Research Institute in Nagpur India).

5. Composition of the evaluation mission

The team will consits of:
- Ir. R. Trietsch
- Mr. Paramasivan

whereas additional support will be given by Mr. Lindeyer of H.M. Embassy in New Delhi, who was present in the preparatory workshop that took place from April 11-13-1983.

6. Duration of the mission

The evaluation will take approximately 5-7 days in India.

7. Report

A joint report with findings and recommendations will be submitted to the Head of the Section for Research and Appropriate Technology within three weeks after the mission's return from India.

APPENDIX B

1. Objectives phase II

The general objective of the programme is to promote the application of slow sand filtration for biological treatment of drinking water in developing countries.

For a better understanding of the background and the scope of the programme, it may be useful to distinguish basic objectives, long-range objectives and the actual shortterm objectives of the programme. Some of the objectives are purpose and mean at the same time.

Actually, the basic objectives may be regarded as descriptors of the ideological concept of the programme; consequently, they are of a more fundamental character:

- to improve the public health and social-economic situation and thus the well-being of the people in developing countries.
- to promote a self-generating autonomous development process, ultimately leading to self-reliance, by creating local capabilities and stimulating the use of local resources in the field of water supply and sanitation in developing countries.
- to further the international collaboration, particularly the international exchange of information, between the developing countries in the field of water supply and sanitation.

The long-range objectives indicate the projected targets of the programme. It is expected that the implementation of the programme will considerably contribute to the fulfilment of these targets and derived objectives. The most important longterm objectives are:

- to create awareness regarding the suitability and possibilities of slow sand filtration on local, national, regional and international level.
- to promote the development of national plans for community water supply and sanitation programmes including the application of slow sand filtration and preferably integrated in multisectoral development programmes.
- to contribute to the improvement of the national infrastructure in the field of water supply and sanitation in the developing countries concerned.
- to generate interest from both national and international organizations for large scale implementation programmes on slow sand filtration.
- to demonstrate the feasibility of the overall approach of the slow sand filtration programme, which may be characterized by the following elements: international collaboration, development of local resources and capabilities and promotion of autonomous development and self-reliance.

The short-term objectives profile the actual intentions of the programme of activities and are directly related to the substantial results to be obtained in the contractual period:

- to develop a process for the preparation of drinking water by adopting and improving the slow sand filtration system to tropical conditions and local circumstances in developing countries.
- to investigate the possibilities for a suitable pre-treatment system.
- to develop and improve appropriate design criteria for the construction of various slow sand filtration plants and suitable pre-treatment installations and that are directed to simple operation and maintenance.
- to gain experiences with experimental village demonstration plants installed at selected sites to make people concerned familiar with the phenomena and the ins and outs of the slow sand filtration process.
- to prepare a series of guidelines on the design, construction, operation, maintenance and management of small slow sand filtration plants in developing countries.
- to demonstrate the suitability and appropriateness of slow sand filtration for developing countries from both technical and social-economic points of view.
- to show the public health and social-economic impact of the introduction of a dependable water supply in rural villages.
- to develop an appropriate methodology for the introduction of a water supply in rural communities in developing countries.

In addition to these groups of objectives also intermediate targets are distinguished. These targets are directly related to the respective steps of the programme of activities, viz.: preparatory activities, realization of village demonstration plants, testing of operation, demonstration and follow-up. The accomplishment of the intermediate targets will be reviewed regularly at the planned meetings of the institutions participating in the project and at the meetings of the Advisory Group.

## 2. Outline phase III

### Introduction

Slow Sand Filtration is a water treatment technique which has a great potential for application in the rural areas of developing countries. When surface water is the only available source of raw water, Slow Sand Filtration will frequently prove the most simple, economic and reliable method to prepare safe drinking water. This may be illustrated by the following characteristics:

- It accomplishes a high degree of simultaneous improvement of the physical, chemical and bacteriological quality of raw water.
- It provides a single step treatment for raw water with turbidity not exceeding 50 NTU. For higher turbidity a pre-treatment unit is required.

- The simplicity of design, construction and operation and maintenance enables the application of local materials and skills.
- The operation costs are low and based rather on semi-skilled labour than on energy or chemical inputs.

In order to promote the application of Slow Sand Filtration in developing countries this integrated research and demonstration project on SSF was initiated a few years ago.

The SSF project has been through two phases of development. In the first phase, knowledge and experience gained in Europe during a century was tested in India, Thailand, Sudan, Kenya and Ghana. After two years of investigations, a number of recommendations and adaptations were proposed to adapt the SSF system to the needs and circumstances in developing countries.

The practical results of this research phase combined with the existing knowledge were subsequently published in the form of the manual: SSF for Community Water Supply in Developing Countries, a Design and Construction Manual; IRC Technical Paper 11.

However, to convince both policy makers and other professionals active in the water supply field of the positive impact the newly acquired knowledge could have on the quality of drinking water prepared through treatment by SSF, one also had to demonstrate the efficiency of the technique under normal working conditions. Phase II therefore focused on the implementation of village demonstration plants; village water supply schemes using SSF to produce safe drinking water from surface water. An extensive community education and participation programme ran concurrently with the various stages of implementation in selected demonstration villages in the participating countries: India, Thailand, Sudan, Kenya, Ghana, Colombia and Jamaica.
This integrated approach of the project in which the community, the public health department and the water supply agency closely cooperated with each other, was chosen in order to increase, through continuous community involvement in the various stages of implementation, the commitment of the community. This commitment greatly enhances the lasting operation of the water supply system once it is completed.

Four of the participating countries have now completed the construction of the demonstration plants and are presently monitoring the performance of the system and evaluating the effectiveness of the integrated approach. The other project countries are expected to complete their village demonstration plants within short. The local demonstration projects serve as a major vehicle for the promotion of SSF as a suitable means of water treatment in the rural areas of developing countries.

Where these projects have already proved successful, a wider application is being promoted already during the execution of the project, both at the local and the national level. A wide interest in SSF has also been created in other developing countries by an active transfer of intermediate results through articles and publications.

Therefore a third phase to this project has been initiated to ensure that the project gathers sufficient momentum to guarentee the implementation of SSF on a larger scale. This phase first and foremost focuses on the promotion of SSF through the dissemination of the results gained so far, but simultaneously provides an opportunity to those countries which for several reasons have lagged behind in the execution of their programme, to complete their SSF plants, and then join in the promotional effort.

Objectives of Phase III

1. To disseminate the results gained so far by providing assistance to the project coordinating institutions for the organization of national seminars on the application of SSF and on other essential project related aspects such as Sanitation and Community Education and Participation. These seminars are primarily meant for national professional staff, but should also give an opportunity to sector representatives from neighbouring countries to learn more about the various aspects of the SSF project.

2. To promote the inclusion of SSF schemes in national plans of the participating countries, which will be developed to achieve the goals set out for the International Drinking Water Supply and Sanitation Decade. In addition, the successful application on a large scale of SSF plants in these countries will have an enormous positive impact on the respectability and acceptation of the purification technique in neighbouring countries.

3. To assist the participating countries in obtaining funds for the implementation of SSF projects by extensively informing donor agencies about the project. Simultaneously, as far as required, working relations have to be established between the donor agencies and the sector agencies in the project countries.

   During the meeting of representatives of the SSF project in September 1980, a number of items were identified for follow-up. Therefore Phase III also aims at:
   - Strengthening of the technical cooperation between developing countries. In the context of this project this could be realised through:
     a. stimulating the publication of project results by the institutions involved (preferably in international sector magazines).

b. short term consultancies to other developing countries by persons in the participating countries who have gained expertise through this project.

- Participation of such consultants as guest lecturer to seminars organized on SSF in other developing countries.
- Finalization of a training manual and teaching modules for the operation and maintenance of SSF plants.
- Further research on some technical aspects of SSF (e.g. declining rate filtration, comparison of up- and down-flow filtration).
- Strengthening of Community Education and Participation Component.

APPENDIX C

RESEARCH AND DEMONSTRATION PROJECT ON SLOW SAND FILTRATION

Recommendations of National Workshop held in Nagpur during April 11-13, 1983

PREAMBLE

In the context of the International Research and Demonstration Project on Slow Sand Filtration, a Workshop was organized jointly by NEERI & IRC, The Netherlands in April 1983. An expert group consisting of research scientists, engineers and public health officials from government department as well as non-governmental agencies discussed the latest findings of the project. Recommendations were made concerning the technological issues involved in water supply systems with special reference to slow sand filtration, economic analysis, public health and health education aspects and information support.

RECOMMENDATIONS

- At national and state level, intersectoral and interdisciplinary approach to planning and implementation of water supply and sanitation projects is essential.
  Greater interaction especially between the Public Health Engineering Departments and public health agencies is crucial and should be strengthened to maximise the benefits from such programmes.

- Provision of water supply alone may not improve the health status and quality of life of the people in the village. It may even result in worsening of the situation leading to health hazards if appropriate drainage and sanitation facilities are not provided.

- Decision for selection of water supply system should not be based only on the initial costs of construction.
  Operation and maintenance cost and the availability of skilled labour should also be taken into consideration and suitable provision made at the planning stage itself. Economic analysis of SSF plants not involving pre-treatment has shown that they are cost effective for populations upto 1,15,000. In the context of the Decade programme, this simple technology adopted in certain regions of the country should be further promoted for wider application in other regions.

- An evaluation programme of existing SSF plants in the country will prove useful to further identify missing links in the existing construction, operation and maintenance practices and to develop suitable rehabilitation plans.

- The central organizations for coordinating and promoting water supply and sanitation as well as health education programmes at national and state levels are inadequate and need to be strengthened to facilitate achieving the "Decade" target.

- At the time of revision of the Ministry of Works & Housing Manual on Water Supply and Treatment (1976) the text on slow sand filtration, including operation and maintenance aspects should be elaborated in the light of recent developments and findings.

- In the curricula of professional courses at all levels, in-depth technical information on simple technologies of water treatment such as SSF, related community education participation aspects should be incorporated so as to provide a better appreciation of problems in implementation, operation and maintenance.

- Information support to allow better planning and implementation of water supply and sanitation programmes is inadequate or lacking. It is essential to establish appropriate information cells at state and national levels.

- States should take urgent steps to establish training centres for water treatment plant operators to ensure effective operation and maintenance of assets already created and to be created during the Decade Programme. These centres should be equipped with necessary facilities including demonstration water treatment plants. It is necessary to develop job specifications on the basis of which training manuals can then be prepared for plant operators and supervisors of water supply systems. Such manuals should be adapted to meet specific local requirements and translated into local languages by the states. The support of international agencies such as WHO and the International Reference Centre (IRC) in the Netherlands may be sought for this purpose.

- There is an immediate need to formulate a suitable system of certification of treatment plant operators and also to encourage local talents who can manage village level water supply systems.

- Very low priority is given to water quality surveillance and existing water quality testing facilities at state levels are totally inadequate. There is an urgent need to strengthen the laboratory facilities at state level and establish such laboratories at district level. Concurrently development of simple equipment for monitoring water supplies at low cost is necessary to promote this activity.

- The introduction of a community water supply in a village could be more smooth if adequate understanding and communication are archieved between the people and the water supply agency. This would avoid undesirable effects such as a higher demand for facilities than can be satisfied by the agency, poor village support for operation and maintenance etc. A liaison unit attached to the water supply agency would prove effective.

- Health education should be an integral part of water supply programmes to bring about changes in the community's practice in relation to water use, hygiene and sanitation and should be planned in conjunction with the community.

- Local persons from the community with appropriate training are best suited to provide health education to others. The village health guide, where present, should play a pivotal role.

- Whilst men, women and children should all be reached by health education in relation to water, women should be most actively involved as prime users of water and being in a key position to influence the family health practices.

- While creating new water supply facilities, a viable long term strategy has to be evolved to meet the future Operation and Maintenance costs. Community self-reliance should be the ultimate goal.

- NGO's which are apolitical and have greater flexibility than Government institutions can play an important role in the promotion of water supply & sanitation programmes.
  Familiarization and orientation of government staff with the innovative approaches of NGO's through exchange of experience and field visits would be valuable.

- The needs especially in the field of health are such that they can only be met by a coordinated effort. Mobilization of all resources and agencies is reguired.

APPENDIX D

PRELIMINARY RECOMMENDATIONS CHIEF ENGINEER'S CONFERENCE
27-28 June 1983 NEERI, NAGPUR

1. The Conference appreciated the efforts of the Ministry of Works & Housing (CPHEEO) in drafting the Master Plan for the Water Supply & Sanitation Sector for the International Water Supply & Sanitation Decade. While the Conference broadly endorsed the Master Plan as drafted, representatives of some of the State Goverments indicated that they have not had time to study the draft in detail and that they would forward their comments, if any, within ten days to the Ministry of Works & Housing. The Conference authorised the Ministry of Works & Housing to finalise the Master Plan Document based on these comments and the deliberations at the Conference.

2. The Conference recommended that adequate financial resources should be provided in the central and state plans for achieving the modest targets of the decade. It was noted that the financial projections in the Master Plan were based on 1980 prices. The actual financial provosions in the VII Plan and the first of the VIII Plan should take into account the escalation in prices from 1980. The Planning Commission and the State Planning Departments should take particular note of this factor. A minimum of six per cent of the VII Plan outlay should be earmarked for the Water Supply & Sanitation Sector as recommended by the Central Working Group on financial resources to achieve the objectives of the International Drinking Water Supply & Sanitation Decade Programme.

3. The Conference also suggested the introduction of several specific measures to augment the financial resources for the water supply sector. Thus, LIC financing for the sector should be increased and made an additionality to the Plan. Further, LIC financing should cover 100 per cent of the project cost, at least in respect of projects costing upto Rs. 100 lakhs. The floating of a lottery to finance at least the operation and maintenance expenditure was suggested. Cess on land revenue, sales tax, income tax, entertainment tax and increase in octroi rates were also recommended.

4. As regards externally aided projects, the Conference recommended that the entire aid received from the external agency should be an additionality to the state plan. Further, the additionality on account of external projects in the Water Supply & Sanitation sector should flow in full to the sector at least during the decade period. The customs duty on equipment, received as part of external aid to projects, may be exempted from customs duty, particularly in the case of rural water supply schemes which are intended to benefit the rural poor.

5. The Conference unanimously endorsed the proposal for the setting up of a national level financing institution for Water Supply & Sanitation on the lines of HUDCO & REC. The institution should be set up immediately and should attempt to make available soft loans. State Government should also set up institutions like Water Supply and Sewerage Boards to enable them to receive loans from the national institution.

6. The Conference noted that the electricity rate for rural water supply schemes was high and recommended that the rate should be brought on par with minor and lift irrigation schemes.

7. The Conference recommended that the centre may appoint a Working Group to study the water rates and collection of revenue by local bodies for water supply and sanitation and to suggest suitable norms in this area.

8. The Conference recommended that the principle of supplying water free to the community should be reconsidered and that water supply to any community should be adequately charged for, to make the schemes self-supporting. The objective of full recovery could be attained in stages.

9. The Conference recommended that a Working Group should be set up by the Ministry of Works & Housing with representation for State Governments to prescribe norms for operation and maintenance of water supply and sanitation projects, on the lines of similar norms for high-way projects. Health Ministry to be associated.

10. The Conference recommended that the Ministry of Works & Housing should take necessary steps to create an All India service of Public Health Engineers. The Ministry of Works & Housing may also augment training facilities for inservice engineers. A separate degree course for public health engineers should be introduced in the appropriate educational institutions.

11. The Conference recommended that additional posts should be sanctioned as soon as the workload increases. The sanction should also cover other infratructure needed, such as vehicles. Procedures should also be streamlined to cover delegation of powers for sanction of project and efficient implementation.

APPENDIX E

NATIONAL SEMINAR ON SLOW SAND FILTRATION, HEALTH EDUCATION, COMMUNITY PARTICIPATION & INFORMATION SUPPORT, NAGPUR (INDIA)
29 June - 1 July 1983

PREAMBLE

A national seminar organised jointly by National Environmental Engineering Research Institute, Nagpur and the International Reference Centre for Community Water Supply & Sanitation, The Netherlands, discussed the findings of the integrated research and demonstration project on slow sand filtration and the exchange of information in relation to water supply and sanitation programmes. The participants consisted of chief engineers, research scientists, public health specialists from government and non-governmental agencies as well as information specialists.

The seminar stressed that slow sand filtration due to its effectiveness and simplicity receive due attention in the choice of water treatment technology.

The provision of water supply alone will not improve the quality of life of the community. An integrated approach involving health education and community participation will help ensuring proper operation and maintenance as well as creating an awareness for safe water use.

Information support to allow better planning and implementation of water supply and sanitation programmes is inadequate or lacking and hence there is an urgent need to establish an effective information exchange network as part of the Decade Plan in India.

RECOMMENDATIONS

- Greater interaction especially between the Public Health Engineering Departments and the public health agencies is stressed to maximise the benefits from such programmes.

- The existing organizations for coordinating and promoting water supply and sanitation as well as health education programmes at national and state levels are inadequate and should be strengthened.

- Provision of water supply alone may not improve the health status and quality of life of the people. It may even lead to worsening of the health status of the people if water supply, drainage and sanitation are not provided simultaneously.

- Operation and maintenance costs should be taken into consideration when selecting a water supply system.

- A viable long term strategy should be evolved to institutionalize Operation and Maintenance and finding a mechanism for the same with emphasis on community self-reliance.

- Technical information on appropriate technologies in water treatment such as SSF and related community education participation aspects should be incorporated in the curricula of professional courses at all levels.

- States should take urgent steps to establish training centres for water treatment plant operators, equipped with necessary facilities including demonstration water treatment plants.

- Job specification and training manuals in local languages should be prepared for plant operators and supervisors.

- The support of International Agencies such as WHO and the IRC, The Netherlands may be sought for this purpose.

- A suitable system of certification of treatment plant operators is needed.

- Local talents to manage water supply systems at village level should be encouraged.

- Water quality surveillance and laboratory facilities for the same should be set up and strengthened at state and district level. Concurrently, development of low cost equipment for monitoring water supplies is required.

SLOW SAND FILTRATION

- Slow sand filtration accepted and adopted in certain regions of the country should be further promoted for wider application in other regions, wherever feasible.

- The SSF process not involving pre-treatment being cost-effective for capacities upto 8 mld should be one among the technology options for community water supplies.

- Evaluation of existing SSF plants in the country should be undertaken to further identify missing links in the construction, operation and maintenance practices and develop suitable rehabilitation plans.

- The text on slow sand filtration in the Ministry of Works & Housing, Manual on Water Supply and Treatment (1976) - should be revised in the light of recent findings and include operation and maintenance aspects.

COMMUNITY PARTICIPATION & HEALTH EDUCATION

- A liaison unit attached to the water supply agency to promote health education and community participation is needed.

- Health education should be an integral part of water supply and sanitation programmes to bring about desirable changes in the community's practice in relation to water use, hygiene and sanitation and should be planned in conjunction with the community.

- Local persons from the community with appropriate training are best suited to provide health education to others. The village health workers, such as village health guides, local dais and ANMs should be actively involved.

- Whilst men, women and children should all be reached by health education in relation to water, women should be most actively involved as prime users of water and being in a key position to influence the family health practices.

- Health education should be introduced at school level and in non-formal education as well.

- NGOs which are apolitical and have greater flexibility than Government institutions can play an important role in the promotion of water supply and sanitation programmes. Familiarization and orientation of government staff with the innovative approaches of NGOs through exchange of experience and field visits would be valuable.

- The development activity process initiated in the project villages should not be retarded or stopped. Therefore the advisory committees should be formed to continue mobilizing the community to further improve the environmental conditions in the village.

INFORMATION SUPPORT

- An effective technological information network should be established by creating appropriate information units at State PHED's and the national level. Its aim should be to exchange technological information (knowledge, experience, technology and methodology) as support to the National Decade Programme as laid down in the Master Plan for Water Supply and Sanitation Sector (April 1981 - March 1991).

- The national network should form part of the International Programme on Exchange and Transfer of Information (POETRI).

- The information units should be set up at superintending engineer's level and supported by an information specialist and other auxiliary staff.

- The information units should locate, collect and analyse technological information and make it readily available to planners, engineers, scientists at all levels and also exchange experience with other State Focal Points and the National Focal Point.

- The information units at state level should establish close contacts with district offices and the field, maintaining communication with engineers, community workers.

Information services which should be provided by the units are:

- digest service, to draw attention to solutions found elsewhere for technical problems;

- news brief, to disseminate pin pointed and new information based on various interest profiles;

- request handling, to locate information on a specific topic;

- document delivery services, to provide copies of documents.

- In accordance with the Decade Master Plan, options of linking the function of technological information transfer with data collection for planning, as part of the Management Information System at state level should be explored.

- States should consider requirements and options for development of information cells at district and/or lower levels.

- The National Focal Point should coordinate activities of State Focal Points and be made responsible for maintaining links with the International POETRI network.

  NEERI should function as the "National Focal Point" for exchange of technical information in close liaison with CPHEEO.

- Appropriate training in information methods and skills for the management, exchange and application of problem oriented, ready to use information should be provided to personnel manning the information units at all levels. Due attention should be paid to the appropriate education of information users.

- A survey of existing information sources and centres both with State PHED's and elsewhere should be carried out leading to an inventory.

- An information user survey should be conducted to identify various categories of users in the community Water Supply and Sanitation Field and their information needs.

- Additional funding of components of the information exchange network is required, supplementing national and/or state funding. In this context the linkage with POETRI-programme executed by IRC would be beneficial.

- A working group should be constituted with respresentatives of State PHED's, information specialists, CPHEEO and NEERI for follow-up action.

APPENDIX F

# PRELIMINARY PROPOSAL TO COMPARE THE HEALTH IMPACT OF DIFFERENT APPROACHES OF IMPROVED WATER SUPPLY AND SANITATION

For discussion at the National Seminar on SSF/CEP Nagpur June 29 - July 1983


## Summary

The project will test the health impact of different approaches to the promotion of sanitation and hygiene; it will seek to indicate which combinations of improvements in water quality, latrine installation, and health education will be most cost-effective in lowering the incidence of water-related disease. The methods to be tested will be replicable on a large-scale in government programmes in India.


## Background

In Phases II and III of the Research and Demonstration project on Slow Sand Filtration India, a Community Education and Participation Component has been included. This component was developed by the Central Health Education Bureau in collaboration with NEERI and the state health authorities, of the four states in which the demonstration villages were located. A very large number of health education activities have been undertaken in the four demonstration villages. In general a uniform methodology was used in all the villages.

It is now timely to carry this a stage further by carrying out a project in which the impact of improved water supply and sanitation will be measured by a number of instruments, and in which the methodology will be systematically varied. This will, it is hoped, provide a firm basis for conclusions on the effectiveness of specific health education activities or approaches in combination with other interventions. The present proposal is an elaboration of the proposal made along similar lines by the Tamil Nadu State Health Education Bureau, at the SSF project review seminar in Nagpur, 11-13 April, 1983.

## Objectives

1. - To study the impact on health, in particular the incidence of diseases related to water and sanitation, of the following interventions alone and in combination:
   - Improved water supply providing water of good quality
   - Programmes to encourage latrine construction and use (private and, where appropriate, public latrines)
   - health education programmes aimed at improved hygiene and sanitation.

2. To study the cost-efectiveness (impact on health compared with cost) of a more intensive as compared with a less intensive approach to health education.

3. To assess the importance, in implementing health education programmes, of factors related to the situation and resources of voluntary agency programmes as compared with government agencies.

4. To experiment with ways of involving the local population more actively in the process of education, and to assess the complexity of information which can be effectively communicated through lower-level health staff to educated and uneducated sections of the rural population, with respect to the prevention of water and sanitation-related diseases.

Method

Ten villages in which improved water supply is planned will be selected. Ten other villages will be chosen to be as similar as possible to the first ten, but not covered by an improved water supply programme.

In these villages different intervention programmes will be carried out. Before, during and after implementing the programmes the incidence of water and sanitation-related disease will be measured.

The ten villages with and the ten villages without an improved water supply will be divided each into 5 groups of 2 villages similar in size, economic condition and social composition.
These villages will be subject to the following other experimental conditions:

1. No other intervention

2. A latrinization programme through near-100% subsidy for private latrines financed through the existing latrinization programme.

3. A "minimum information" health education programme carried out by government health staff, aimed to identify the minimum information content to be given in a community to develop community acceptance of sanitary measures including latrines, soakpits and other required changes as identified by the health staff.

4. An "itensive" health education programme carried out by government health staff, aimed to identify the maximum level of information and understanding which can in practical terms be communicated to and absorbed by village people, in relation to the route of transmission of water- and sanitation-related diseases and the ways in which they can be interrupted. Preventive measures will be decided upon by the village population.

5. An "intensive" health education programme similar to the above, but carried out by a voluntary agency health project.

   Health impact will be evaluated by a separate team, through the following studies:

   1. Infant and child mortality

   2. Diarrhoea recall surveys before and after the interventions.

   3. Stool examination for parasitic infectation.

   4. Examination of the records of health institutions (such as the Primary Health Centre), of the community health guide and as far as possible of private practitioners (of various schools and medicine) serving the villages, to establish any change in the incidence of water- and sanitation-related disease for which people seek treatment.

APPENDIX G

PROPOSAL FOR DEVELOPMENT OF AN APPROPRIATE TRAINING METHOD FOR OPERATORS OF SSF PLANTS IN RURAL AREAS

## I Summary

This proposal is for a three year project to compare the effectiveness of on the job training of operators of SSF plants and training at a training center.
During the project, training materials will be developed and control devices and tests for proper operation and maintenance will be selected.

## II Introduction

In the research and demonstration project on SSF, this water purification technique has proven to be appropriate especially for rural areas. No other single process can effect such an improvement in the quality of normal surface waters. The comparatively simple design makes it easy to use local materials and skills in its construction. Operation and maintenance construction is relatively simple and cheap.

However, experiences show that operation and maintenance of existing plants merit improvement. Training of operators and developing simple control devices for operation of the plant are both key elements required to safeguard the water supply. The first step in this direction was taken by publishing the manual "Guidelines for Operation and Maintenance of Slow Sand Filtration Plants in Rural Areas of Developing Countries" and the companion "Trainers" manual. Yet more field testing in training programmes is required to distinguish the most appropriate training approach. Training could vary between on the job training and in a training center. Both methods and a combination of the two could be tested in a number of situations. More research is required to select and test the simplest control devices and tests to be used by the operator for monitoring the operation of the plant. Improvement in the training of operators will further support the implementation of SSF in rural areas.

The present proposal is an elaboration of the ideas formulated at the Workshop on SSF in Nagpur, April 11-13, 1983.

## III Objectives

- to field test different training methods and training materials for the training of operators of SSF plants.

- to prepare a cost estimate for various ways of training.

- to define the minimum required knowledge and practical experience for proper operation of the SSF plant.

- to further develop low-cost devices for measuring turbidity and flow velocity.

IV Workplan

The workplan is comprised of:

- identification of existing training facilities.

- selecting operators of existing plants/new plants to be trained.

- developing an intensive training programme for central training at the training center using small scale pilot filter for practical lessons.

- developing training course using full scale operating filter for this course.

- preparing a training programme for on-site training.

- producing background materials for the courses.

- identifying and testing the most appropriate control devices and control tests for proper operation.

- conducting training courses for trainers at training center.

- performance evaluation of operators of existing plants before and after the training.

- conducting training courses for selected operators at the selected training centers (pilot plant and full scale plant).

- evaluation of the training courses.

- conducting on the job training of selected operators.

- conducting second course at the center for selected operators.

- evaluation and reporting.

V Output

- A Publication evaluating the results of the different training methods and materials used.

- Documentation on the most suitable equipment for operation and control of SSF.

- A number of trained trainers in SSF in the participating countries.

- Improved operation and maintenance conditions in a number of SSF plants from which the operators have been training through the project.

VI Organization

Training will be conducted by institutes in particular.
NEERI will be involved, IRC will provide support in the setting up and orientation of the training, in preparing training materials, in assisting in training seminars and coordinating the evaluation of the results. Further, it will disseminate the information obtained.